

Preventative conservation initiative for the long-term storage of conserved objects from the USS Monitor Collection
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Final Report and White Paper
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Background

In 2002, the Civil War ironclad USS *Monitor*'s gun turret arrived at The Mariners' Museum and Park (TMMP) ending a multi-year effort to retrieve artifacts from the ship's wreck site off Cape Hatteras, North Carolina. Approximately 210-tons of material were retrieved, encompassing about 20% of the vessel, including much of the engine room.

The recovery project was a herculean endeavor conducted by the US Navy's Mobile Diving and Salvage Unit (MDSU) 2, USS *Wotan*, Phoenix International, TMMP, and archaeologists from the National Oceanic and Atmospheric Administration (NOAA). In 1975 the Secretary of Commerce designated the wreck of the USS *Monitor* as our country's first National Marine Sanctuary, to be managed and protected by NOAA under the Sanctuaries Act. However by the mid-1990s, it was determined the ship was in an advanced state of deterioration, and that archaeological expedition and recovery was necessary to save the most significant components from the vessel. A five-year effort commenced, which culminated in the retrieval of its iconic gun turret. The 120-ton "revolving marvel" was the first turret of its kind ever put on a ship, the vessel being fully-designed by Captain John Ericsson, one of the great ship designers of the 19th century. The success of *Monitor*'s turret directly spurred a revolutionary change in naval architecture, leaving a lasting legacy which can be seen in the turreted battleships of the World Wars and modern destroyers of today.

Since 1987, TMMP has been the designated principle repository for all objects recovered from the wreck site. The Museum is responsible for the conservation, curation, and display of the artifacts. Following the recovery effort, the museum built and opened the USS *Monitor* Center in 2007 to accommodate and interpret the massive influx of artifacts. The USS *Monitor* Center features the award winning *Ironclad Revolution* exhibit and the Batten Conservation Complex (BCC), a dedicated wing of nearly 15,000 square feet, complete with viewing windows and a platform to allow direct visitor observation of conservation treatments. By the sheer number of metal artifacts retrieved, the complex is the largest marine archaeological metals conservation laboratory in the world. The ultimate goal for recovered and conserved USS *Monitor* artifacts is to illuminate the stories of the ship, crew, period technology, and tumultuous events of the American Civil War.

Due to a host of challenges early on in the conservation project's history, compounded by a multi-decade artifact treatment timeline, detailed planning had not been undertaken to look at the long-term storage of the artifacts once conservation was complete. Therefore, beginning in 2013, conservators within the BCC began a preventative conservation initiative to address the long-term care of conserved artifacts from the collection. Initially, this was a rehousing effort followed by the relocation of environmentally sensitive artifacts (most of the collection) into individual

microclimate storage bags. Although this work provided increased stability for the artifacts, it made access to the collection more difficult for both condition assessments and artifact monitoring, and limited ready access for conducting research with the collection. Therefore conservators proposed to remedy the problem by transferring the conserved *Monitor* collection to microclimate-controlled storage cabinets. The elimination of individual artifact storage bags would allow for better organization of the collection and enhanced preventative conservation care while providing enhanced public access to *Monitor* artifacts.

Project Funding and Work Plan

In July 2017, the National Endowment for the Humanities announced that TMMP has been awarded a grant of \$24,861.00 to support the purchase of artifact storage cabinets. The purpose of this grant was to advance a preventive conservation initiative for the long-term storage of conserved objects from the USS *Monitor* Collection in stabilized microclimate environments. Funding actions allowed for the purchase of thirteen museum-quality storage cabinets produced by Delta Designs Ltd, with gasket-sealed doors capable of supporting controlled relative humidity (RH), in conjunction with Arten silica gel desiccant packets and Onset HOB0® data loggers.

Conservation staff appealed to TMMP's Bronze Door Society (BDS), for matching funds to meet NEH grant requirements. BDS is the oldest, member-managed affinity group of the institution with a focus to support preservation-based initiatives. It is an active group of Museum patrons who gather regularly for lectures, behind-the-scenes programing, and social events in order to:

- Encourage an in-depth understanding of the Museum's collections, and library archives
- Support the Museum's mission and programs by funding the acquisition, conservation, and exhibition of artifacts, works of art and archival materials
- Provide educational programs and learning opportunities for the community

BDS is named in homage to a spectacular set of maritime-themed bronze doors that were commissioned by Museum co-founder, Archer M. Huntington, and created in the early 1930's by renowned American sculptor, Herbert C. Adams, specifically for the Museum's original entrance. (<https://www.marinersmuseum.org/bronze-door-society/>)

The BDS released funds in October 2017 to match the NEH grant award for the amount of \$24,862. A start date for project was November 1, 2017. The purchase order for the cabinets was issued in November, and remaining equipment for the grant was purchased in January-March 2018. Expenses for project supplies not originally allocated to grant or match funds were covered by Museum operating budget funds for the amount of \$249.10.

Although staff originally planned to install the cabinets in a second floor laboratory to provide better access to the collection, the cabinets were relocated to a first floor room dedicated to the storage, research, and study of the artifacts (figure 1). The new plan required the reorganization of the BCC's three main work areas which began in October 2017, and continued until the end of February 2018. Storage racks occupying the soon-to-be research room were relocated, and pallet

shelving in that space which had previously held the conserved USS *Monitor* collection were repurposed to other museum collection storage locations. Adjusting the spatial layout also allowed for the ability to mount the cabinets on tracking, if funding opportunities arise in the future for the purpose of compacting the cabinets.

The purchased cabinets arrived and were installed on January 19, 2018. A month was allotted for the cabinets to acclimate with HOBO UX100-11 data loggers being installed to verify that the cabinets could buffer exterior environmental changes (low air-exchange-rate) (figures 2-3).

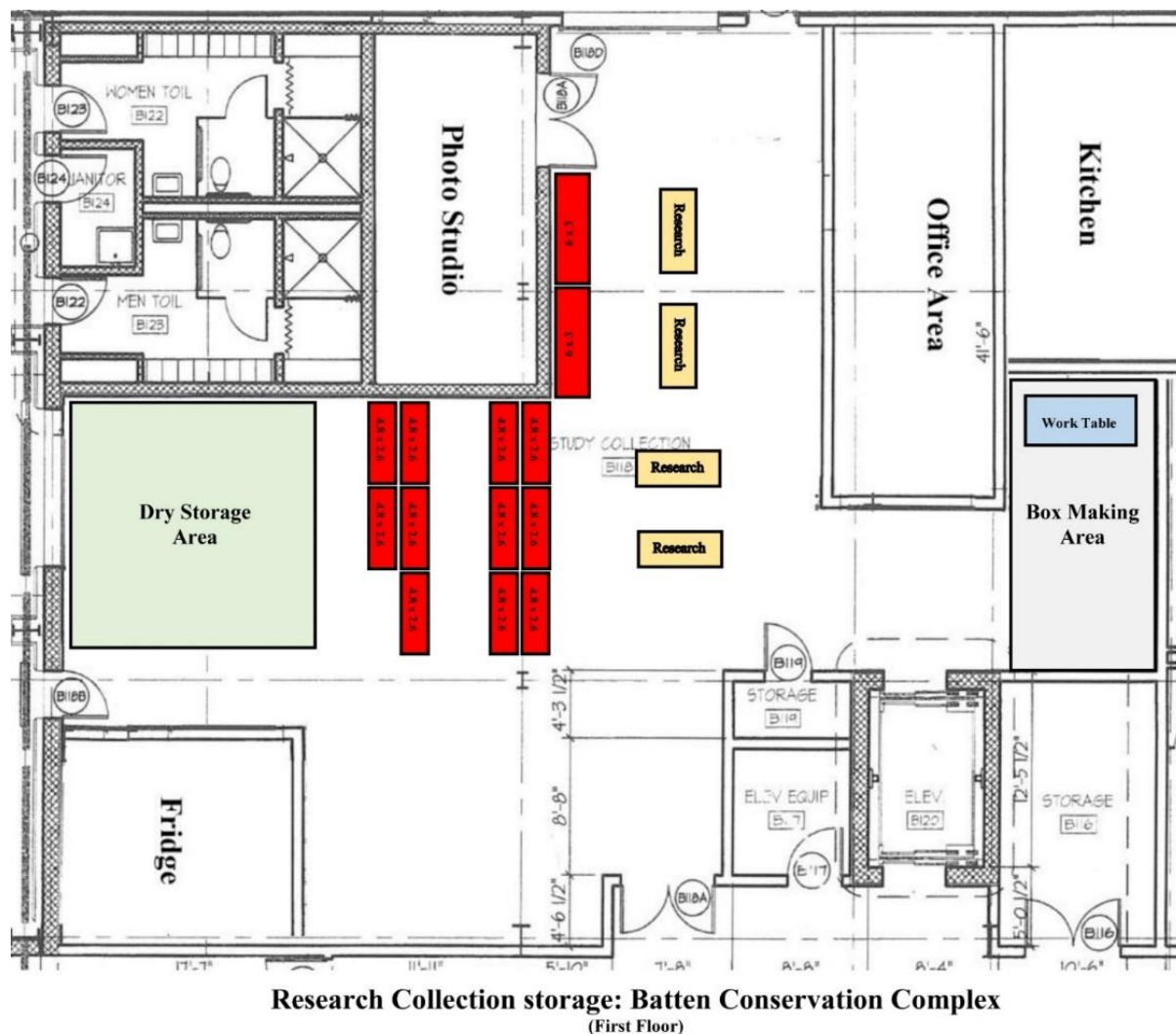


Figure 1. Layout plan for the collection storage area with the cabinets shown in red, tables for research in yellow, and a storage box making area in gray.



Figure 2. Cabinets being delivered to the storage area and one of the newly-acquired data loggers



Figure 3. Views of the cabinets after installation.

Once it was determined that the cabinets had met the required criteria, silica gel packets were installed by conservator Elsa Sangouard and Lesley Haines. A technique developed by the Fiske Center for Archaeological Research of the University of Massachusetts, Boston campus (UMB) for constructing silica tube sleeves was utilized enabling the desiccant material to be hung within the cabinets and not occupy shelf space as seen in figures 4 and 5 (Piechota 2016).

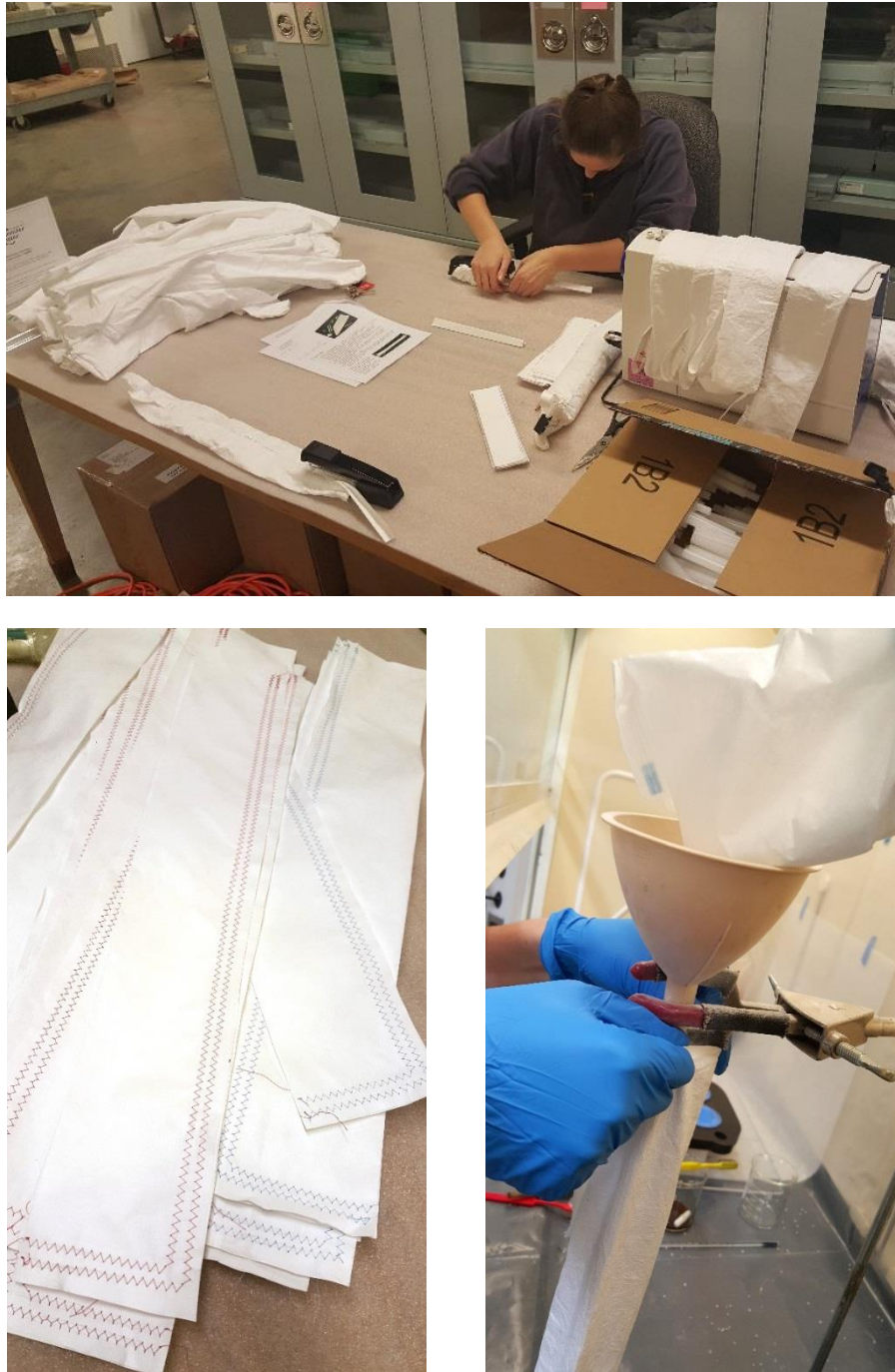


Figure 4. Silica-gel sleeves being stitched together out of Tyvek® and filled with desiccant.



Figure 5. Completed tubes installed in cabinets.

Collection Manager Michael Saul started steadily transferring the *Monitor* collection into cabinets afterwards, and artifacts are segregated by material types. Organic and glass stored at 50% RH with metals stored below 25%. Data loggers in each cabinet are monitored regularly by conservation staff (data downloaded bi-yearly) and compared with respect to the environmental readings of the storage room itself.

Accomplishments

To date 1,493 objects have been relocated to the Delta Design cabinets. Throughout the process, artifacts were visually inspected for condition changes by Michael Saul. Items that were identified as in need of a more thorough assessment or retreatment were transferred to one of the project conservators for observation and/or treatment. As needed, objects were also rehoused in specially constructed boxes prior to being relocated into storage in the cabinets. Current conditions successfully meet best practices for the storage of archaeological collections by material type.

Floor space has been reserved for future cabinet expansion, if the need arises. The storage room has been rearranged, with tables and chairs to allow space for study of the collection by outside researchers. In November 2018 staff hosted the first colleague requesting access, from the Naval History and Heritage Command, who desired to study items from the collection in comparison to similar objects excavated from CSS *Hunley*.

In order to achieve greater accessibility and grow the Museum's audience, the Museum experimented with reducing admission prices to one dollar during August 2017 and May-September 2018. In conjunction with the summer schedule of 2018, conservation staff hosted storage "Open House" days every Saturday, thereby allowing all visitors to see the collection housed in the new storage cabinets and view a selection of artifacts arranged on the research tables (figure 6). At the annual commemoration of the Battle of Hampton Roads on March 9, 2019 another "Open House" was featured as a component of the event. Over one thousand members of the greater Hampton Roads community attended the event. People of all ages were able to enjoy and experience USS *Monitor* artifacts up close, and speak with conservation staff about the project.



Figure 6. Conservator Lesley Haines speaking to Bronze Door Society members during an Open House, and Material Cultural specialist Hannah Fleming describing how *Monitor* artifacts are stored during Battle of Hampton Roads weekend

Continuation of the Project

The project has met a one-year benchmark at the time of this report, and still requires more time to gather microclimate data. Initial results from loggers inside the storage cabinets versus the greater room reveal a clear difference in the level of daily humidity control (figure 7-8).

Information gathered through this project will be disseminated to the conservation, museum, and archaeology communities through presentations, publications, and posters. The analysis of data gathered on the microclimate performance of the storage cabinets over time may be of great use to other institutions which hold environmentally sensitive archaeological collections. The collection care protocols and methods developed during this project could be used as a framework by other institutions to advance their own storage procedures.

Long Term Impact

The acquisition of these items has enabled the careful relocation of environmentally sensitive USS *Monitor* artifacts to humidity controlled and monitored microclimate storage, facilitating improved long-term preventative conservation care for the objects. Ample space is still available for newly conserved artifacts to be migrated into appropriate storage within the cabinets as the conservation project progresses. This project is a vital advancement in the Museum's continuing compliance with CFR 36 Part 79, as required by a Curatorial Services Agreement with the National Oceanic and Atmospheric Administration's (NOAA) *Monitor* National Marine Sanctuary. In addition, it has created a more inviting space for the public and individual researchers to visit, resulting in improved access to the collection.

References

Pechora, D. 2016. Desiccant Tubes for Storage of Unstable Metals. STASH (Storage techniques for art, science and history). Accessed February, 2016. <http://stashc.com/the-publication/environment/dessicant-tubes-for-storage-of-unstable-metals/>

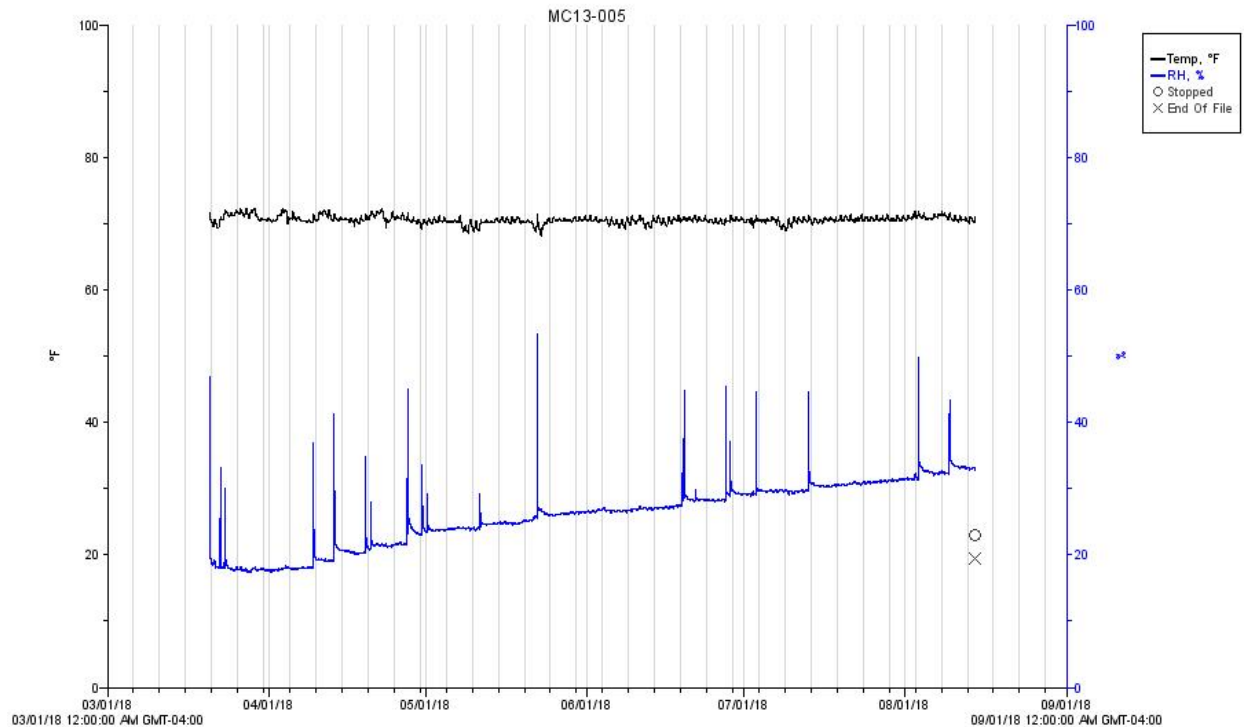


Figure 7. Five months of temperature and humidity data for one of the metal artifact storage cabinets. The large peaks indicate when the cabinet was opened to move artifacts in, resulting in a drop in effectiveness of desiccant over time. Importantly, when the cabinet remained closed there was very little daily variation. Since this graph was plotted, the silica-gel has been recharged.

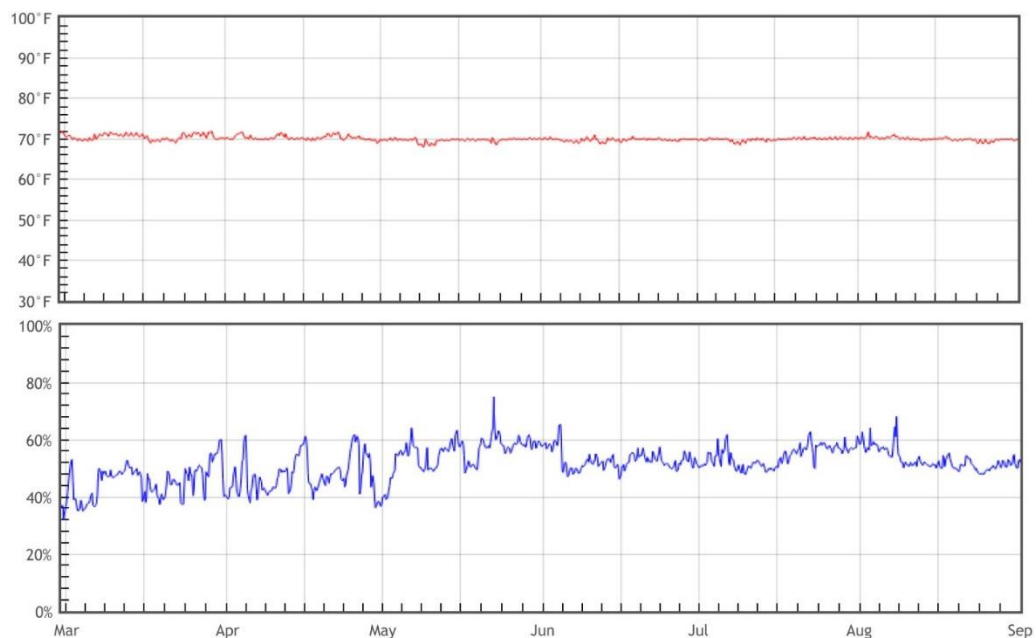


Figure 8. Same five months of data recording as above, but from a logger located outside the cabinets, note the daily fluctuations. In some cases it's over a 20% spread.